1. \[5x + 3 = 8 - 2x\]
   
   \[5x + 2x + 3 = 8\]
   
   \[7x = 8 - 3\]
   
   \[7x = 5\]
   
   \[x = \frac{5}{7}\]

2. \[3x - 12 = 3(x - 3)\]
   
   \[3x - 12 = 3x - 9\]
   
   \[-12 = -9\] but \[-12 \neq -9\] contradiction
   
   No solution.

3. \[4(x + 5) = -3x + 7(x + 2) + 6\]
   
   \[4x + 20 = -3x + 7x + 14 + 6\]
   
   \[4x + 20 = 4x + 20\]
   
   True statement so everything works.

4. \[\frac{x}{5} - 3 = \frac{x}{3} + 1\]

   \[LCM = 15\]
   
   \[(15)(\frac{x}{5}) - 3 \cdot 15 = \left(\frac{x}{3}\right)(\frac{15}{1}) + 1 \cdot 15\]
   
   \[3x - 45 = 5x + 15\]
   
   \[-45 = 5x - 3x + 15\]
   
   \[-45 - 15 = 2x\]
   
   \[-60 = 2x\]
   
   \[x = -30\]
Solving Linear Equations Worksheet

1. $3x - 7 = x + 3$
   
   $3x - x - 7 = 3$
   
   $2x = 3 + 7$
   
   $2x = 10$
   
   $x = 5$

2. $5 - 2x = 4x + 17$
   
   $5 - 17 - 2x = 4x$
   
   $-12 = 4x + 2x$
   
   $-12 = 6x$
   
   $-2 = x$

3. $10x + 3 = 6(x + 2) + 4x$
   
   $10x + 3 = 6x + 12 + 4x$
   
   $10x + 3 = 10x + 12$
   
   $3 = 12$

   But $3 \neq 12$, so this is a contradiction.

   Therefore, no solution.

4. $2(3x + 12) = 6(x + 4)$

   $6x + 24 = 6x + 24$

   This is a true statement

   So the answer is all real numbers.
5) \( \frac{x}{2} + 4 = 13 - \frac{x}{4} \)  

\[
\frac{x}{2} \cdot \frac{4}{4} + (4 \cdot 4) = (13 \cdot 4) - \frac{x}{4} \cdot \frac{4}{1}.
\]

\[2x + 16 = 52 - x\]
\[2x + x + 16 = 52\]
\[3x = 36\]
\[\Rightarrow x = 12\]

6) \( \frac{5-x}{2x+22} = \frac{5}{6} \)

\[6(5-x) = 5(2x+22)\]
\[30 - 6x = 10x + 110\]
\[30 - 110 - 6x = 10x\]
\[-80 = 16x\]
\[-5 = x\]

7) \( 5 - \frac{x}{2} = \frac{x}{3} + 10 \)  

\[
(5) \cdot (6) - \frac{x}{2} \cdot \frac{6}{1} = \frac{x}{3} \cdot \frac{6}{1} + (10) (6)
\]

\[30 - 3x = 2x + 60\]
\[30 - 3x - 2x = 60\]
\[-5x = 60 - 30\]
\[-5x = 30\]
\[\Rightarrow x = -6\]

8) \( 7x - 6 = 2 + 3x + 2(2x - 4) \)

\[7x - 6 = 2 + 3x + 4x - 8\]
\[7x - 6 = 7x - 6\]

True statement

Solution can be the set of all real numbers